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December 15, 2000

Mr. Mark D. Siipola
U.S. Army Corps of
Engineers
CENWP-EC-HR
Portland, OR 97208-2946

Mr. John Malek
U.S. EPA
ECO 083
1200 6th Ave
Seattle, WA 98101

Mr. Tom Melville
Department of
Environmental Quality
811 SW 6th Ave
Portland, OR 97204

Re: Addendum to Dredged Material Characterization Study, Marine Terminal 6, Berths 603-605 and Marine Terminal 5, Berth 503

Regional Dredge Team:

Enclosed please find *Addendum No. 1 to: Dredged Material Characterization Study, Marine Terminal 6, Berths 603-605 and Marine Terminal 5, Berth 503* dated December 14, 2000.

We look forward to meeting with you on December 21, 2000 at 1:30 p.m. at the Corps Building to finalize discussions on the project. As you are aware, the project is scheduled to begin January 5, 2000.

Thank you in advance for your review.

Sincerely,

Port of Portland
John L. Childs, P.E.
Marine Division

c: Sebastian Degens/Port of Portland
Judy Linton/Corps
Kathi Larson/USFW
Jeremy Buck/USFW
Ben Meyer/NMFS

USEPA SF



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HARTCROWSER

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December 14, 2000

Anchorage

Mr. John Childs, P.E.
Environmental Project Manager
Port of Portland
7201 N Marine Drive
Portland, Oregon 97203

Boston

Re: Addendum No. 1 to:
Dredge Material Characterization Study
Marine Terminal 6, Berths 603-605; and Marine Terminal 5, Berth 503
J-15045

Chicago

Dear Mr. Childs:

Denver

This letter provides additional sampling and analysis results for dredge material characterization work at Terminal 6, Berths 603-605. This is an addendum to the Hart Crowser report—Dredge Material Characterization Study, Marine Terminal 6, Berths 603-605, and Marine Terminal 5, Berth 503—dated November 20, 2000. Subsequent to the issuance of this report, additional sediment samples were collected to better define the quality of the subsurface sediments that will be exposed at the dredge cut.

Fairbanks

As discussed in this addendum, these new data confirm that constituents beneath the proposed dredge prism that will be exposed during the maintenance dredging event are below Lower Columbia River Management Area screening levels, and should therefore provide a suitable environment for aquatic organisms.

Jersey City

Introduction

The Port of Portland (Port) intends to maintenance dredge Terminal 6, Berths 603-605, and discharge this material to the Suttle Road temporary upland rehandling facility. Hart Crowser recently conducted an evaluation of sediment, elutriate, and leachate quality of the proposed dredge prism materials at Berths 603-605 (Hart Crowser, 2000). Previous data collected in September 1998 (Hart Crowser, 1999) had shown that the material below the dredge prism, i.e., material that will be exposed after dredging is "clean" for all constituents except tributyltin (TBT), which was not analyzed. At the time the previous sampling was conducted, the Port decided that TBT analysis was not necessary because the Port had never dredged to the depths in question. This rationale is consistent with the Lower Columbia River Management Area (LCRMA) guidance.

Juneau

Long Beach

Portland

Seattle



However, the Regional Dredge Team has subsequently requested that the Port obtain TBT analytical data from beneath the dredge prism to fill in the "data gap" left by the September 1998 sampling event. In conjunction with the September 1998 data, which still meets the "recency" guidelines of the LCRMA, the requested TBT data will provide full characterization of the quality of the post-dredging sediment surface.

To fulfill this request of the Regional Dredge Team, Hart Crowser performed additional sampling and analysis of subsurface sediments beneath the dredge prism on November 20, 2000. The results of these sampling and analysis activities are presented below.

Previous Sampling Activities at Terminal 6

Hart Crowser, 1999. In September 1998, the Port conducted a sediment characterization study of several marine terminals, including Terminal 6, to obtain preliminary dredge material characterization data in support of the permitting process for the deepening of the Columbia River navigation channel (Hart Crowser, 1999). Three sediment cores were collected at Terminal 6, as shown on Figure 1 (T6-01, T6-02, and T6-03). These cores were composited into two Dredge Material Management Units (DMMUs) based on their depth within the dredge prism. DMMU T6-C1 was composited over the 0 to -3 ft. depth interval (-40 to -43 ft. CRD), and DMMU T6-C2 was composited over the -3 to -5 ft. depth interval (-43 to -45 ft. CRD) (Hart Crowser, 1999).

In the surficial DMMU (T6-C1), the only chemical that exceeded its LCRMA-SL was TBT (0.33 µg/L, compared to the LCRMA-SL of 0.15 µg/L). In the deeper DMMU (T6-C2), all of the chemical constituents were below their corresponding LCRMA-SLs. However, TBT was not analyzed in the deeper DMMU because the source of TBT (ablation or exfoliation of hull coatings on ships) typically results in surficial deposits beneath the berthing areas, and also because the deeper DMMU was below the historical dredging depth for the terminal.

Hart Crowser, 2000. In November 2000, gravity cores were collected from nine locations in Berths 603-605 (T6-00-GC01 through T6-00-GC09), as shown on Figure 1. Proposed dredge material was collected and composited between about -40 to -42 ft CRD (Hart Crowser, 2000). The composite sample from Berths 603-605 (T6-00-COMP1) and a duplicate of this composite sample (T6-00-COMP2) showed that TBT concentrations had degraded since the last sampling event, and are presently below the LCRMA screening level (0.087 and 0.096 µg/L, respectively). The decline in TBT concentrations over the last two years is probably attributed to increasing institutional controls on this chemical worldwide, coupled with natural attenuation processes in the river.



Additional Sediment Sampling and Analysis Activities

To better define the TBT profile in subsurface sediments beneath Terminal 6, a total of three stations were sampled at Berths 603-605 on November 20, 2000 (T6-00-VC01 through T6-00-VC03), as shown on Figure 1. These three stations were combined to form a series of depth-integrated samples representative of the sediments beneath the proposed dredge prism. A composite sample from the depth interval -42 to -43 feet was analyzed for this study, and deeper intervals were archived. Per LCRMA guidance, one composite sample is appropriate for characterizing a dredge prism of this size in a "moderate risk" area.

Station designations, sampling coordinates, and coring intervals are presented in Table 1. Sample analytical parameters and sediment descriptions are presented in Table 2.

Field Procedures. Sediment cores were collected using a vibracore with a lined, 4-inch-diameter aluminum core barrel deployed from the sampling vessel, *John B. Preston*. Location control was obtained using a Differential Global Positioning System (DGPS) with a published accuracy of ± 3 meters. David Evans & Associates provided the vessel and skipper, and Golder Associates provided the corer and a coring technician. Hart Crowser supervised and documented the field activities, and processed the cores for analysis.

Sediment Compositing Scheme. At each of the three sampling stations, cores were subdivided into three intervals based on depth below the proposed dredge cut. The sediment samples from all three stations were then composited based on sample elevation to produce samples that are representative of the entire dredge prism. The three depth-integrated composite samples were labeled T6-00-COMP, 42-43; T6-00-COMP, 43-44; and T6-00-COMP, 44-45. The last four digits in these sample labels correspond to the sediment elevation in feet below the Columbia River Datum.

Chemical Testing. The composite sample from the -42 to -43 feet CRD interval (T6-00-COMP, 42-43) was submitted to Columbia Analytical Services (CAS) for analysis of organotins (including tributyltin). The deeper compositing intervals were archived (frozen) at CAS for possible future analysis (see Table 2).

Physical Characteristics

Field geologic descriptions of the sediments are summarized in Table 2. In the target interval beneath the dredge prism, from -42 to -45 feet CRD, sediments coarsen with depth. The sediments grade from soft, brown SILT and slightly sandy SILT in the upper portion of the sampling interval to medium-dense, brown to gray, silty SAND and SAND in the lower portion of the sampling interval.



Port of Portland
December 14, 2000

J-15045
Page 4

This geologic profile suggests that finer grained sediments, similar to the more recent and surficial deposits in these berthing areas, have been mixed down slightly below -42 feet by burrowing organisms, prop wash, or past dredging events at the terminal. With increasing depth, however, these silty deposits yield to coarser grained sediments that probably represent native river bed material.

Chemical Analytical Results

Organotin analytical results of the composited sediment sample at the depth that will be exposed after dredging are compared to LCRMA screening levels in Table 3. Laboratory certificates of analysis are provided in Attachment A. Based on a cursory review of the data quality, these data are acceptable for use. The samples arrived at CAS in good condition and were analyzed within holding times. Surrogate recoveries, laboratory control samples, and continuing calibration results are all within acceptable limits, and no method blank contamination was reported.

TBT was detected in sample T6-00-COMP, 42-43, at a concentration of 0.097 µg/L (Table 3). This concentration is below the LCRMA-SL of 0.15 µg/L. No other organotin compounds were detected in the sample. These data show that adverse chemical contamination will not be exposed during maintenance dredging, and the quality of the post-dredging sediment surface should provide a suitable environment for aquatic organisms.

Thank you for the opportunity to provide services to you on this project. Please call if you have any questions or require additional information regarding this project.

Sincerely,

HART CROWSER, INC.

KEITH A. KROEGER
Aquatic Toxicologist

TODD M. THORNBURG, PH.D.
Senior Associate

Attachments:

Table 1 - Core Locations and Elevations

Table 2 - Sample Analytical Parameters and Sediment Descriptions

Table 3 - Organotin Analytical Results, Sediment Composite Beneath Dredge Prism

Figure 1 - Subsurface Sediment Sampling Locations

Attachment A - Laboratory Certificates of Analysis, Columbia Analytical Services

Table 1 - Core Locations and Elevations
Terminal 6, Berths 603-605, Port of Portland
Portland, Oregon

Core Location	Sampling Date	Latitude	Longitude	Core Recovery (feet)	Mudline Elevation (CRD)	Bottom Elevation (CRD)
T6-00-VC01	11/20/00	45° 38' 33.54	122° 45' 03.64	5.0	-40.7	-45.7
T6-00-VC02	11/20/00	45° 38' 25.84	122° 44' 53.25	6.8	-40.8	-47.6
T6-00-VC03	11/20/00	45° 38' 18.56	122° 44' 43.37	7.4	-41.9	-49.3

Table 2 - Sample Analytical Parameters and Sediment Descriptions
Terminal 6, Berths 603-605, Port of Portland
Portland, Oregon

Sample Designation	Top Sample Elevation (CRD)	Bottom Sample Elevation (CRD)	TBT Analysis	Archive (freeze)	Sediment Description
T6-00-COMP, 42-43	42	43	X		Soft, brown, SILT to sandy SILT
T6-00-COMP, 43-44	43	44		X	Med-dense, brown to gray, sandy SILT to silty SAND
T6-00-COMP, 44-45	44	45		X	Med-dense, brown to gray, silty SAND to SAND

**Table 3 - Organotin Analytical Results, Sediment Composite Beneath Dredge Prism
Terminal 6, Berths 603-605, Port of Portland
Portland, Oregon**

Lab ID		K2009081-001
Sample ID	LCRMA	T6-00-COMP-42-43
Sample Date	SL	11/20/00
Organotins in µg/L		
Tetra-n-butyltin	-	0.05 U
Tri-n-butyltin (TBT)	0.15	0.097
Di-n-butyltin	-	0.05 U
n-Butyltin	-	0.02 U

Notes:

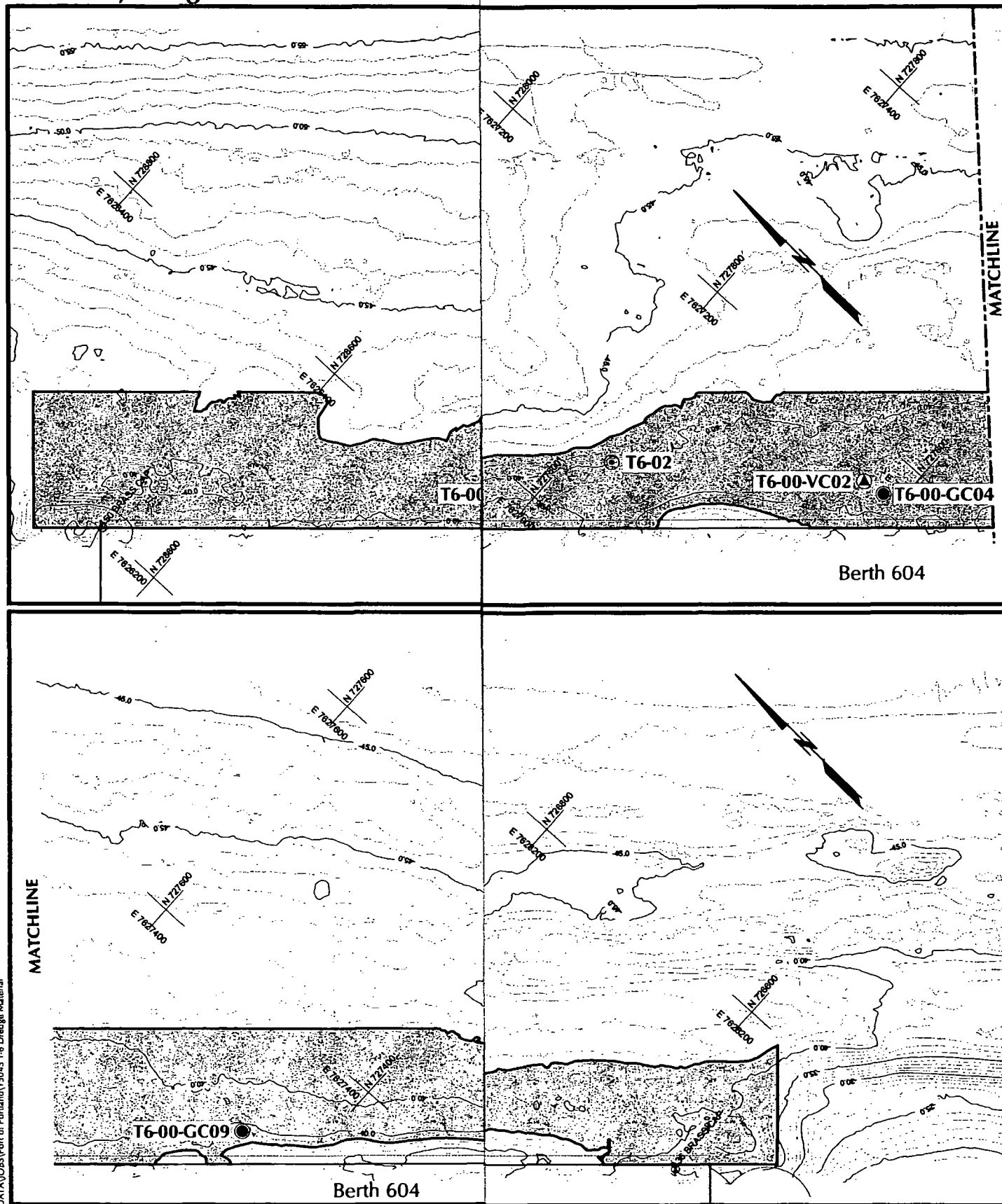
LCRMA: Dredged Material Evaluation Framework Lower Columbia River Management Area.

SL: Screening Level.

-- Not Applicable.

U: Not detected at the indicated method reporting limit.

Subsurface Sediment Sampling Port of Portland, Terminal 6, Berths Portland, Oregon



Note: Base map prepared from a plan provided by the Port of Portland.

Legend:

T6-00-GC07 ● Phase I Gravity Core Sample Location and Depth

T6-00-VC01 ▲ Phase II Vibracore Sample Location and Depth

T6-01 ⊙ Existing Vibracore Sample Location and Depth



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J-15045

11/00

Figure 1

ATTACHMENT A
LABORATORY CERTIFICATES OF ANALYSIS
COLUMBIA ANALYTICAL SERVICES

HART CROWSER INC.

NOV 30 2000

Portland Office



November 29, 2000

Service Request No: K2009081

Todd Thornburg
Hart Crowser, Inc.
Five Centerpointe Drive, Suite 240
Lake Oswego, OR 97035

Re: Port of Portland - T6/J-15045

Dear Todd:

Enclosed are the results of the rush sample(s) submitted to our laboratory on November 20, 2000. For your reference, these analyses have been assigned our service request number K2009081.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 3260.

Respectfully submitted,

Columbia Analytical Services, Inc.

Harvey Jacky
Project Chemist

HJ/gep

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The reported value is estimated because of the presence of matrix interference.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

00003

COLUMBIA ANALYTICAL SERVICES, INC.

Client: Hart Crowser
Project: Port of Portland - T6/J-15045
Sample Matrix: Sediment

Service Request No.: K2009081
Date Received: 11/20/00

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for sample(s) designated for Tier III data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS) and Initial/Continuing Calibration Verification Standards (ICV/CCV).

All EPA recommended holding times have been met for analyses in this sample delivery group.

No difficulties were experienced during analysis of this batch.

Approved by _____

HK Date *11/29/00*

00004

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Hart Crowser, Inc.
Project: Port of Portland - T6/J-15045
Sample Matrix: Sediment

Service Request: K2009081
Date Collected: 11/20/00
Date Received: 11/20/00
Date Porewater Extracted: 11/21/00

Butyltins in Porewater

Sample Name: T6-00-COMP,42-43
Lab Code: K2009081-001
Test Notes: X

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tetra-n-butyltin	EPA 3520C	Krone	0.05	1	11/21/00	11/28/00	ND	
Tri-n-butyltin Cation	EPA 3520C	Krone	0.02	1	11/21/00	11/28/00	0.097	
Di-n-butyltin Cation	EPA 3520C	Krone	0.05	1	11/21/00	11/28/00	ND	
n-Butyltin Cation	EPA 3520C	Krone	0.05	1	11/21/00	11/28/00	ND	

X

Porewater generated in accordance with DDMP guidelines, ACOE Seattle District, August 1998; unfiltered

Approved By: VN Date: 11-29-00

1522/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Hart Crowser, Inc.
Project: Port of Portland - T6/J-15045
Sample Matrix: Sediment

Service Request: K2009081
Date Collected: NA
Date Received: NA
Date Porewater Extracted:

Butyltins in Porewater

Sample Name: Method Blank
Lab Code: K201121-MB
Test Notes: X

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tetra-n-butyltin	EPA 3520C	Krone	0.05	1	11/21/00	11/28/00	ND	
Tri-n-butyltin Cation	EPA 3520C	Krone	0.02	1	11/21/00	11/28/00	ND	
Di-n-butyltin Cation	EPA 3520C	Krone	0.05	1	11/21/00	11/28/00	ND	
n-Butyltin Cation	EPA 3520C	Krone	0.05	1	11/21/00	11/28/00	ND	

X

Porewater generated in accordance with DDMP guidelines, ACOE Seattle District, August 1998; unfiltered

Approved By: VN

Date: 11-29-00

1S22/020597p